

1 CLAIMS

2 We claim;

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4 1. A blend of polymeric materials comprising

5 (A) of from about 1 to about 99.99 weight percent based on the combined weights of
6 Components A, B and C of at least one substantially random interpolmer; and
7 wherein said interpolmer;

8 (1) contains of from about 0.5 to about 65 mole percent of polymer units derived
9 from;

10 (a) at least one vinyl or vinylidene aromatic monomer, or

11 (b) at least one hindered aliphatic or cycloaliphatic vinyl or vinylidene
12 monomer, or

13 (c) a combination of at least one vinyl or vinylidene aromatic monomer and
14 at least one hindered aliphatic or cycloaliphatic vinyl or vinylidene
15 monomer;

16 (2) contains of from about 35 to about 99.5 mole percent of polymer units derived
17 from at least one aliphatic α -olefin having from 2 to 20 carbon atoms;

18 (3) has a molecular weight (M_n) greater than about 1,000;

19 (4) has a melt index (I_2) of from about 0.01 to about 1,000;

20 (5) has a molecular weight distribution (M_w/M_n) of from about 1.5 to about 20;
21 and

22 (B) of from about 99 to about 0.01 weight percent based on the combined weights of
23 Components A, B, and C of one or more conductive additives and/or one or more
24 additives with high magnetic permeability ; and

25 (C) of from 0 to about 98.99 weight percent based on the combined weights of
26 Components A, B, and C of one or more polymers other than A.

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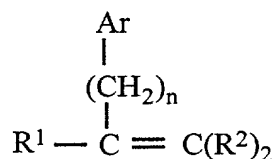
2. The blend of Claim 1 wherein;

(i) Component A is present in an amount of from about 5 to about 97 weight percent based on the combined weights of Components A, B and C;

(ii) Component A contains of from about 1 to about 55 mole percent of polymer units derived from;

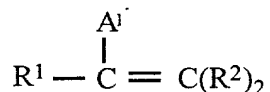
(a) at least one of said vinyl or vinylidene aromatic monomers,

Component A(1)(a), represented by the following general formula:



wherein R^1 is selected from the group of radicals consisting of hydrogen and alkyl radicals containing from 1 to about 4 carbon atoms, preferably hydrogen or methyl; each R^2 is independently selected from the group of radicals consisting of hydrogen and alkyl radicals containing from 1 to about 4 carbon atoms, preferably hydrogen or methyl; Ar is a phenyl group or a phenyl group substituted with from 1 to 5 substituents selected from the group consisting of halo, C_{1-4} -alkyl, and C_{1-4} -haloalkyl; and n has a value from zero to about 4; or

b) at least one of said hindered aliphatic or cycloaliphatic vinyl or vinylidene monomers, Component A(1)(b), represented by the following general formula:



wherein A^1 is a sterically bulky, aliphatic or cycloaliphatic substituent of up to 20 carbons, R^1 is selected from the group of radicals consisting of hydrogen and alkyl radicals containing from 1 to about 4 carbon atoms, preferably hydrogen or methyl; each R^2 is independently selected from the group of radicals consisting of hydrogen and alkyl radicals

26 containing from 1 to about 4 carbon atoms, preferably hydrogen or

27 methyl; or alternatively R^1 and A^1 together form a ring system; or

28 (c) a combination of at least one of said vinyl or vinylidene aromatic

29 monomer and at least one of said hindered aliphatic or cycloaliphatic vinyl

30 or vinylidene monomer;

31 (iii) Component A contains of from about 45 to about 99 mole percent of polymer
32 units derived from at least one of said aliphatic α -olefins selected from the group
33 consisting of ethylene or a combination of ethylene and at least one of propylene,
34 4-methyl pentene, butene-1, hexene-1, and octene-1;

35 (iv) Component A has a molecular weight (M_n) of from about 5,000 to about
36 1,000,000;

37 (v) Component A has a melt index (I_2) of from about 0.1 to about 100;

38 (vi) Component A has a molecular weight distribution (M_w/M_n) of from about 1.8 to
39 about 10;

40 (vii) Component B is present in an amount of from about 0.5 to about 50 weight
41 percent based on the combined weights of components A, B and C and one or
42 more selected from the group consisting of

43 a) conducting carbon black, carbon fibers, graphite, or graphite fibers;

44 b) metals and alloys selected from the group consisting of iron, nickel, steel,
45 aluminum, zinc, lead, copper, bronze, brass, tin, zirconium, silver and gold;

46 c) doped and undoped conjugated intrinsically electrically conductive
47 polymers selected from the group consisting of substituted and
48 unsubstituted polyanilines, polyacetylenes, polypyrroles, poly(phenylene
49 sulfides), polyindoles, polythiophenes and poly(alkyl) thiophenes,
50 polyphenylenes, polyvinylene/phenylenes, random or block copolymers of
51 acetylenes and thiophenes, anilines and thiophenes, poly(N-methyl)pyrrole,
52 poly(o-ethoxy)aniline, polyethylene dioxythiophene (PEDT), and poly (3-
53 octyl)thiophene;

54 d) semiconductors and conductors selected from the group consisting of
55 doped and undoped metal oxides and nitrides selected from the group

consisting of tantalum oxide, antimony doped tin oxide, titanium dioxide-coated with antimony doped tin oxide and aluminum nitride; and doped titanium dioxide;

e) high magnetic permeability additives selected from the group consisting of magnetite, ferric oxide (Fe_3O_4), MnZn ferrite, and silver-coated manganese-zinc ferrite particles;

(viii) Component C is present in an amount of from about 2.5 to about 94.5 weight percent based on the combined weights of Components A, B and C and one or more selected from the group consisting of styrene homopolymers and copolymers, alpha-olefin homopolymers and interpolymers, thermoplastic olefins, styrenic copolymers, elastomers, thermoset polymers, vinyl halide polymers, and engineering thermoplastics.

3. The blend of Claim 1 wherein;

(i) Component A is present in an amount of from about 10 to about 94.5 weight percent based on the combined weights of components A, B and C;

(ii) Component A contains of from about 2 to about 50 mole percent of polymer units derived from;

a) the group consisting of styrene, α -methyl styrene, ortho-, meta-, and para-methylstyrene, and the ring halogenated styrenes, or

b) the group consisting of 5-ethylidene-2-norbornene or 1-vinylcyclohexene, 3-vinylcyclohexene, and 4-vinylcyclohexene; or

c) a combination of at least one of a) and b);

(iii) Component A contains of from about 50 to about 98 mole percent of polymer units derived from ethylene or a combination of ethylene with one or more $\text{C}_3\text{-C}_8$ α -olefins;

(iv) Component A has a molecular weight (M_n) of from about 10,000 to about 500,000;

(v) Component A has a melt index (I_2) of from about 0.5 to about 30;

- (vi) Component A has a molecular weight distribution (M_w/M_n) of from about 2 to about 5; and
- (vii) Component B is present in an amount of from about 1 to about 25 weight percent based on the combined weights of Components A, B and C and is selected from the group consisting of conducting carbon black, carbon fibers, graphite, graphite fibers, and doped and/or undoped conjugated intrinsically electrically conductive polymers selected from the group consisting of substituted and unsubstituted polyanilines, polyacetylenes, polypyrroles, poly(phenylene sulfides), polyindoles, polythiophenes and poly(alkyl) thiophenes, polyphenylenes, polyvinylene/phenylenes, random or block copolymers of acetylenes and thiophenes, anilines and thiophenes, poly(N-methyl)pyrrole, poly(o-ethoxy)aniline, polyethylene dioxythiophene (PEDT), poly (3-octyl)thiophene; indium doped tin oxide, antimony doped tin oxide, and titanium dioxide-coated with antimony doped tin oxide, magnetite, ferric oxide (Fe_3O_4), MnZn ferrite, and silver-coated manganese-zinc ferrite particles; and
- (viii) Component C is present in an amount of from about 5 to about 89 weight percent based on the combined weights of Components A, B and C and is one or more olefin homopolymers and copolymers selected from the group consisting of polypropylene, propylene/ C_4 - C_{20} α - olefin copolymers, polyethylene, and ethylene/ C_3 - C_{20} α - olefin copolymers, polyester, nylon, polyphenylene oxide, polycarbonate.

4. A blend of Claim 3 wherein

- i) said vinyl or vinylidene aromatic monomer, Component A1(a), is styrene;
- ii) said aliphatic α -olefin, Component A2, is ethylene, or a combination of ethylene with one or more C_3 - C_8 α - olefins;
- iii) said conductive additive, Component B, is selected from the group consisting of conducting carbon black, carbon fibers, graphite, and graphite fibers; and
- iv) said thermoplastic polyolefin, Component C, is selected from the group consisting of one or more olefin homopolymers and copolymers selected from

the group consisting of polypropylene, polypropylene/C₂-C₂₀ α-olefin copolymers, polyethylene, polyethylene/C₃-C₂₀ α-olefin copolymers, ethyl vinyl acetate (EVA), and rubber-modified polypropylene.

5. The blend of Claim 3 wherein;

- (i) Component B is a doped and/or undoped conjugated intrinsically electrically conductive polymers selected from the group consisting of substituted and unsubstituted polyanilines, polyacetylenes, polypyrroles, poly(phenylene sulfides), polyindoles, polythiophenes and poly(alkyl) thiophenes, polyphenylenes, polyvinylene/phenylenes, random or block copolymers of acetylenes and thiophenes, anilines and thiophenes, poly(N-methyl)pyrrole, poly(o-ethoxy)aniline, polyethylene dioxythiophene (PEDT), and poly (3-octyl)thiophene.

6. The blend of Claim 3 wherein; Component B is a magnetic particle selected from the group consisting of magnetite, ferric oxide (Fe₃O₄), manganese-zinc ferrite, and silver-coated manganese-zinc ferrite particles.

7. The blend of Claim 1 wherein;

- (i) Component C are homogeneous interpolymers having a narrow branching distribution and composition distribution prepared using a metallocene catalyst system.

8. The blend of Claim 7 wherein;

- (i) Component C comprises a substantially linear interpolymers.

9. A blend of Claim 3 wherein

- i) said vinyl or vinylidene aromatic monomer, Component A1(a), is styrene;
- ii) said aliphatic α-olefin, Component A2, is ethylene or a combination of ethylene with one or more C3-C8 α-olefins

5 iii) said conductive additive, Component B, is polyaniline.

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1 10. A blend of Claim 3 wherein

2 i) said vinyl or vinylidene aromatic monomer, Component A1(a), is styrene;

3 ii) said aliphatic α -olefin, Component A2, is ethylene or a combination of ethylene
4 with one or more C3-C8 α -olefins;

5 iii) said conductive additive, Component B, is an indium doped tin oxide,
6 antimony doped tin oxide, or titanium dioxide-coated with antimony doped
7 tin oxide.

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1 11. A blend of Claim 3 wherein Component C is selected from the group consisting of
2 one or more of polyisoprene, polybutadiene, natural rubbers, ethylene/propylene
3 rubbers, ethylene/propylene diene (EPDM) rubbers, styrene/butadiene rubbers, and
4 thermoplastic polyurethanes.

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1 12. A blend of Claim 1 further comprising;

2 (D) an additive selected from the group consisting of talc, calcium carbonate,
3 alumina trihydrate, glass fibers, marble dust, cement dust, clay, feldspar, silica or
4 glass, fumed silica, alumina, magnesium oxide, magnesium hydroxide, indium
5 doped tin oxide, antimony oxide, zinc oxide, barium sulfate, aluminum silicate,
6 calcium silicate, titanium dioxide, titanates, glass microspheres, chalk and any
7 combination thereof.

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1 13. A blend of Claim 1 wherein Component A is a crosslinked interpolymer.

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1 14. A blend of Claim 4 wherein Component A is a crosslinked interpolymer.

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1 15. A blend of Claim 5 wherein Component A is a crosslinked interpolymer.

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1 16. A blend of Claim 6 wherein Component A is a crosslinked interpolymer.

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- 1 17. A blend of Claim 8 wherein Component A is a crosslinked interpolymer.
- 2
- 1 18. A blend of Claim 9 wherein Component A is a crosslinked interpolymer.
- 2
- 1 19. A blend of Claim 10 wherein Component A is a crosslinked interpolymer.
- 2
- 1 20. A blend of Claim 11 wherein Component A is a crosslinked interpolymer.
- 2
- 1 21. A blend of Claim 1 wherein Component B has a magnetic permeability 20 times
2 greater than that of copper.
- 3
- 1 22. A blend of Claim 21 wherein Component B has a magnetic permeability 100
2 times greater than that of copper.
- 3
- 1 23. An article resulting from injection, compression, extrusion, coextrusion, or blow
2 molding, solution casting, thermoforming, or rotomolding the blend of Claim 1.
- 3
- 1 24. An article resulting from coating a substrate with the blend of Claim 1.
- 2
- 1 25. A sheet, film, multilayered structure, prepared from the blend of Claim 1.
- 2
- 1 26. A wire or cable assembly prepared from the blend of Claim 1.
- 2
- 1 27. A tire prepared from the blend of Claim 1.
- 2
- 1 28. A flooring system, bench top or counter top prepared from the blend of Claim 1.
- 2
- 1 29. A conductive foam or fiber prepared from the blend of Claim 1.
- 2

- 1 30. A conductive foam comprising a blend of polymeric materials comprising
2 (A) of from about 10 to about 90 weight percent based on the combined weights of
3 Components A, B and C of at least one substantially random interpolmer; and
4 wherein said interpolmer;
5 (1) contains of from about 0.5 to about 65 mole percent of polymer units derived
6 from;
7 (a) at least one vinyl or vinylidene aromatic monomer, or
8 (b) at least one hindered aliphatic or cycloaliphatic vinyl or vinylidene
9 monomer, or
10 (c) a combination of at least one vinyl or vinylidene aromatic monomer and
11 at least one hindered aliphatic or cycloaliphatic vinyl or vinylidene
12 monomer;
13 (2) contains of from about 35 to about 99.5 mole percent of polymer units derived
14 from at least one aliphatic α -olefin having from 2 to 20 carbon atoms;
15 (3) has a molecular weight distribution (M_w/M_n) of from about 1.5 to about 20;
16 and
17 (B) of from about 0.5 to about 50 weight percent based on the combined weights of
18 Components A, B, and C of one or more conductive additives and/or one or more
19 additives with high magnetic permeability ; and
20 (C) of from about 10 to about 90 weight percent based on the combined weights of
21 Components A, B, and C of one or more polymers other than A.
22

1 31. The foam of Claim 30 wherein

- 2 a) Component B is present in an amount of from about 1 to about 40
3 weight percent based on the combined weights of Components A, B,
4 and is selected from the group consisting of carbon black, alkyl
5 amines; quaternary ammonium compounds, LiPF_6 , KPF_6 , lauryl
6 pyridinium chloride, sodium cetyl sulphate, glycerol esters, sorbitan
7 esters, and ethoxylated amines; and

b) Component C; selected from the group consisting of ethylene and/or alpha olefin homopolymers and of ethylene/alpha olefin interpolymers.

32. The foam of Claim 30 wherein Component B is present in an amount of from about 0.5 to about 2 weight percent based on the combined weights of Components A, B, and C and Component B is an antistatic additive and wherein Component C is LDPE, a homogeneous ethylene/alpha olefin interpolymer or ethylvinyl acetate.

33. The foam of Claim 30 wherein Component B is present in an amount of from about 10 to about 30 weight percent based on the combined weights of Components A, B, and C and Component B is a conductive additive and Component C is LDPE, a homogeneous ethylene/alpha olefin interpolymer or ethylvinyl acetate.

34. A blend of polymeric materials comprising

(A) from about 1 to about 99.99 weight percent based on the combined weights of Components A, B and C of at least two substantially random interpolymers; and

(1) wherein more than 50 wt % of said interpolymers

(a) contains from about 0.5 to about 65 mole percent of polymer units derived from;

(i) at least one vinyl or vinylidene aromatic monomer, or

(ii) at least one hindered aliphatic or cycloaliphatic vinyl or vinylidene monomer, or

(iii) a combination of at least one vinyl or vinylidene aromatic monomer and at least one hindered aliphatic or cycloaliphatic vinylidene monomer;

(b) contains of from about 35 to about 99.5 mole percent of polymer units derived from at least one aliphatic α -olefin having from 2 to 20 carbon atoms; and

(2) wherein less than 50 wt% of said interpolymers contains

(a) of from about 0.5 to about 45 mole percent of polymer units derived from;

(i) at least one vinyl or vinylidene aromatic monomer, or

(ii) at least one hindered aliphatic or cycloaliphatic vinyl or vinylidene monomer, or

(iii) a combination of at least one vinyl or vinylidene aromatic monomer

and at least one hindered aliphatic or cycloaliphatic vinylidene monomer;

(b) contains of from about 55 to about 99.5 mole percent of polymer units

derived from at least one aliphatic α -olefin having from 2 to 20 carbon atoms;

and

(B) from about 99 to about 0.01 weight percent based on the combined weights of

Components A, B, and C of one or more conductive additives and/or one or more

additives with high magnetic permeability; and

(C) from 0 to about 98.99 weight percent based on the combined weights of

Components A, B, and C of one or more polymers other than those of A.

35. A blend of Claim 34 wherein

i) said vinylidene aromatic monomer, Component A1(a), is styrene;

ii) said aliphatic α -olefin, Component A2, is ethylene or a combination of ethylene with one or more C3-C8 α -olefins;

iii) said conductive additive, Component B, is an conducting carbon black, polyaniline, indium doped tin oxide, antimony doped tin oxide, titanium dioxide-coated with antimony doped tin oxide.

36. The blend of Claim 34 wherein Component C is a rubber modified polypropylene.

37. A latex comprising the blend of Claim 1.

38. A latex comprising the blend of Claim 34.